FACTSHEET Plant Protection & Quarantine

United States Department of Agriculture

Animal and Plant Health Inspection Service

July 1997

Citrus Canker

Of all of the agricultural pests and diseases that threaten citrus crops, citrus canker may be one of the most devastating.

Citrus canker is a highly contagious disease caused by the bacterium *Xanthomonas axonopodis* pathovar *citri*. An infestation can destroy entire crops, but the disease poses no health risk to humans or animals.

Severe infection may produce a variety of effects, including defoliation, dieback, severely blemished fruit, reduced fruit quality, and premature fruit drop.

Appearance and Strains

Citrus canker symptoms appear on the fruit, leaves, and twigs of infected plants, and typically consist of small, round, blisterlike formations called lesions. Lesions usually become apparent about 7 to 14 days after infection. As the lesions mature, the epidermis or outer layer of tissue ruptures, producing a craterlike spot lined with tan-colored tissue that is usually surrounded by an oily, water-soaked margin and a yellow ring that looks like a halo. On fruit, the lesions appear scablike or corky. On leaves, old lesions sometimes fall out, leaving behind a scattering of round holes.

There are at least three distinct strains or types of citrus canker, as determined by serological tests and DNA analysis. The "A" strain affects members of the plant family Rutaceae, including most citrus species and hybrids, especially grapefruit, lime, sweet lime, and trifoliate orange. The "B" strain of citrus canker affects lemons in Argentina, Uruguay, and Paraguay. However, Mexican or key lime, sour orange, Rangpurlime, sweet lime, citron, and occasionally sweet orange and mandarin orange can also be affected. The "C" strain affects only Mexican lime growing in Brazil. Other, unrecognized strains may also exist. The current and all previous U.S. infestations have been associated with the "A" strain.

History

Citrus canker most likely originated in southeastern Asia and spread to Japan, South Africa, Australia, the Pacific Islands, South America, and the United States. In 1910, citrus canker was reported for the first time in the United States, in the Gulf Coast States. Before citrus canker was declared eradicated here in 1933, more than \$6 million was spent in Florida alone to destroy about 258,000 grove trees and 3 million nursery trees. Removal and burning of infected trees was (and remains) the only effective means of control. In the Gulf Coast States, from Florida to Texas, nearly 20 million trees in nurseries and groves had been destroyed by 1934 because they had been infected or exposed to citrus canker. As late as 1949, surveys and inspections were being conducted in the Gulf region on scattered, noncommercial trees, abandoned groves, and wild trees (primarily trifoliate orange seedlings).

Between 1986 and 1992, citrus canker was found at 13 locations in 4 Florida counties. Some locations involving groves consisted of a single property while others in residential areas included as many as 240 properties. An eradication program was carried out as a joint effort between the Florida Division of Plant Industry and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS). The program consisted of surveys to detect infected trees, removal and destruction of infected and adjacent trees, and regulatory activities necessary to prevent the spread of the disease.

By the time the program was completed, 580 trees were destroyed at 281 residential properties and 33,263 trees were destroyed in 5 commercial groves. The last positive tree was found in Manatee County in January 1992. Based on a 2-year period in which intensive surveys found no infected plants, eradication of citrus canker in Florida was declared in 1994. Following the declaration of eradication, relatively little survey activity has taken place in the previously infested areas.

In 1995, an infestation of "A" strain citrus canker was found in the Miami metropolitan area. Although this outbreak did not involve any commercial citrus

groves, more than 600,000 residential properties have been surveyed within the quarantine area and nearly 65,000 citrus trees have been cut down. This eradication program is a joint effort of the Florida Department of Agriculture and APHIS.

In June 1997, a new outbreak of citrus canker was detected in commercial groves in Manatee County, FL.

Infection

Like most bacterial plant diseases, citrus canker is greatly influenced by temperature and moisture conditions. The disease is most likely to develop when heavy rains occur during a period when the mean temperature is greater than 68 °F (20 °C).

Spread

Citrus canker spreads swiftly over short distances by wind-driven rain, flooding, air currents, insects, birds, and human movement within groves. Overhead irrigation may also play a role in spreading the bacteria.

Movement of infected plants, seedlings, propagative material, and fruit is the primary means of spreading the canker pathogen over larger distances. Contaminated clothing, tools, packing boxes, and other items associated with harvesting and postharvest handling of fruit are also potential sources of infection.

Canker bacteria survive and multiply primarily in naturally occurring lesions. Bacteria may also survive in crevices in the bark tissues of citrus trees. Bacterial populations appear to decline rapidly in soil. It has been suggested that the bacterium may survive at low population levels on citrus hosts without symptoms developing, and it may also survive for short periods of time on some weeds and grasses. Neither of these survival mechanisms has been proven, however.

Identification and Control

When an area is suspected of being infested with citrus canker, fruit or leaf samples are sent for testing by State and Federal laboratories.

In countries where citrus canker is an established, ongoing problem, control of the disease is primarily achieved through a combination of tactics, including the production and use of disease-resistant plant varieties, use of protective sprays, and phytosanitary measures (use of certified nursery stock). Outbreaks of citrus canker may also be reduced when windbreaks are constructed in windy areas.

When environmental conditions are favorable for the spread of the disease, chemical control measures are not entirely effective. However, materials containing copper (bordeaux mixture, copper hydroxide, basic copper chloride, copper oxychloride, and tribasic copper sulfate) are the most effective bacterial sprays for protecting leaves and fruit. These materials can reduce the incidence of disease, but they will not eliminate established infections. Extensive use of copper may also cause phytotoxicity problems in treated groves.

Pruning infected shoots or plant parts during late summer and autumn can reduce the risk of infection the following spring. Defoliation of canker-affected trees can also further reduce infection risk.

In the United States, quarantining areas affected by citrus canker is still practical. Eradication of infected and adjacent trees is the most effective means of protecting commercial citrus from the disease. Once positively identified, diseased trees in commercial groves are uprooted, placed in a pile, and burned. Surrounding, disease-free trees are destroyed as well, as an added precaution. In residential areas, diseased trees and surrounding, exposed trees are cut down or removed.

Areas where trees have been destroyed must be kept free of citrus sprouts and seedlings. Movement of citrus fruit budwood and other plant parts is prohibited from property on or adjacent to sites where infected plants are located. All clothing, tools, and equipment used in infested areas must be properly disinfected.

For More Information

If you have questions about citrus canker, call the central office of APHIS' Plant Protection and Quarantine (PPQ) unit at (301) 734–8645, or contact the nearest regional office of PPQ:

Central Region (210) 548–2750 Northeastern Region (609) 757–5070 Southeastern Region (601) 863–1813 Western Region (916) 857–6241

In addition, APHIS' Internet home page (http://www.aphis.usda.gov) provides up-to-date information on various agricultural pests and diseases and other related topics.